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EXPERIMENTAL STUDIES ON ACUTE EFFECTS OF PASSIVE SMOKING IN ASTHMA

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Patients with asthma often complain of respiratory symptoms during or after passive smoking. Experimental studies on the effects of short-term passive smoking have been performed in adults but not in children; their results are heterogeneous and some of them show deficiencies of their study design. In a series of controlled exposure studies we investigated the occurrence and degree of acute effects of short-term passive smoking in adults and children with asthma. Throughout all studies we used a constant cigarette smoke concentration of 20 ppm carbon monoxide.

In the first study 24 adult patients with mild bronchial asthma and 16 healthy subjects were enrolled. Subjects breathed cigarette smoke or room air while sitting at rest for one hour. Lung function was measured before and after exposure, and airway responsiveness to inhaled methacholine was determined within one hour after exposure. As compared to room air, lung function parameters did not change significantly and airway responsiveness was not altered after passive smoking.

As it seemed reasonable to expect a more pronounced airway response to air pollutants in children than in adults, we then studied 11 children with mild bronchial asthma while using an analogous experimental protocol. However, similarly as seen in the adults, lung function and airway responsiveness to inhaled histamine were not affected by one hour of passive smoking in these children.

The next study was designed to investigate the effects of cigarette smoke during vs after exposure and to compare the effects observed at resting ventilation with those observed at increased ventilation rate. Thirteen children with exercise-induced asthma participated in this study. They breathed either cigarette smoke or room air for one hour and exercised on a bicycle ergometer during the last six minutes of exposure. Mean forced expiratory volume in one second, as a measure of lung function, decreased by about 5% during passive smoking as compared to room air. This effect could be attributed to three smoke-sensitive children and disappeared during and after exercise testing.

Most patients with bronchial asthma show an increase in symptoms, an impairment of lung function and an enhancement of airway responsiveness during night compared to daytime. Thus, in a further study we investigated the effects of passive smoking in the evening on the course of lung function and airway responsiveness until the next morning. Seventeen subjects with mild bronchial asthma were exposed to cigarette smoke or room air for three hours at rest. On the average, lung function did not change during passive smoking but demonstrated small impairments at 03.00 a.m. in the night and 07.00 a.m. in the next morning. Similarly, airway responsiveness to methacholine showed a tendency towards increased values at these times.

From these studies we conclude that individual patients with asthma can show a temporary impairment of lung function during or several hours after passive smoking. It is noteworthy that it is difficult to detect smoke-sensitive subjects reliably, since there is no obvious correlation between measured changes of functional parameters and acute or anamnestic symptoms due to passive smoking.

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